Termiticide Efficacy RESULTS

The USDA-FS' stalwart Termiticide Testing Program unveils efficacy findings in its 2006 Termiticide Report

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In 2006, the United States Department of Agriculture's Forest Service (USDA-FS) administered 43 agreements with termiticide manufacturers as part of its ongoing termiticide testing program. The number of candidate termiticides installed at test sites was lower than in recent years (see infographic on page 62).

One termiticide was installed at the four national test sites in Florida (February), Arizona (April), Mississippi (May) and South Carolina (September). Another termiticide was installed in Mississippi and South Carolina, and installation of this product at the last two sites will occur in early 2007. This partial installation allowed the registrant to get the test under way early, without having to wait for the next installation cycle to begin in February.

Because termiticides require five years of efficacy data for registration, the number of installations per year is a hopeful sign of new products to come. This year's decline in installations, following two years of high activity, is similar to the cyclical installation pattern of the past (see page 62). It reflects normal product development activity.

During 2006, the USDA-FS also evaluated 30 termiticides and five impregnated barriers in ongoing field trials. Six termiticides were screened in the laboratory, which is another measure of future products.

TESTING SOIL-APPLIED TERMITICIDES

Two standard field methods are used to test soil-applied liquid termiticides: ground boards and concrete

USDA-FS reorganizes Southern Research Station

The USDA-FS Southern Research Station (SRS) conducts forest research throughout the Southeast. The "Termite Project" falls within this station. Declining budgets and changing business operations brought about a reorganization of SRS in 2006. For example, 28 research units were merged into 15 to create a more efficient, effective and flexible structure, capable of meeting future challenges.

As part of the reorganization, three insect and disease units and scientists from another unit were combined into the Insects, Diseases and Invasive Plants Research Unit. This new unit is the second-largest in SRS, containing three research teams led by team leaders. The teams include Termites and Wood-Destroying Insects in Starkville, Miss.; Southern Pine Beetle and Invasive Insects in Pineville, La.; and Diseases and Invasive Plants in Athens, Ga., and Auburn, Ala. Terry Wagner will continue to lead the Termite Project including its Termiticide Testing Program, and Kier Klepzig, based in Pineville, will serve as the project leader of the overall Insects, Diseases and Invasive Plants Research Unit.

The new organization reunites projects with a common origin. For example, the Termiticide Testing Program is the oldest USDA-FS insect research project in the South, founded in the mid-1930s. Other insect groups in SRS can trace their origins to this project, including the bark beetle project in Pineville.

The realignment is expected to have little impact on the Termiticide Testing Program.

Table 1. Number of years that termiticides remained effective in concrete slab (CS) and ground board (GB) tests at four field sites applying the EPA guideline and Florida efficacy rule†. Fractions of years occurred when products were installed out of cycle. Control = percentage of all control plots attacked over the life of the study.

		Arizona		Florida		Mississippi		South Carolina		FL SE
% A.I.	Test	EPA	FL	EPA	FL	EPA	FL	EPA	FL	States
Bifenthrin — Biflex TC (est. 1986)										
0.031	CS	0	9	4	11	2	5	2	4	4
0.062††	CS	16	16	20	20	7	7	10	16	10
0.125††	CS	10	15	9	20	2	7	20	20	9
0.25	CS	20	20	20	20	16	17	20	20	20
0.5	CS	6	20	20	20	18	20	20	20	20
0.031	GB	6	7	4	5	2	2	3	4	4
0.5	GB	10	11	14	20	12	15	8	11	14
Control	CS	53%	53%	71%	71%	56%	56%	64%	64%	—
Control	GB	67%	67%	86%	86%	79%	79%	87%	87%	—
Cypermethrin (est. 1982)										
0.125	CS	1	4	0.5	1.5	1	3	2	2	2
0.25††	CS	4	4	10.5	12.5	3	5	4	4	4
0.5††	CS	4	5	4.5	9.5	7	14	12	12	11.5
1.0	CS	8	10	7.5	21.5	6	15	12	16	15
1.0	GB	3	6	4.5	4.5	5	5	5	6	5
Control	CS	63%	63%	66%	66%	56%	56%	65%	65%	—
Control	GB	75%	75%	76%	76%	87%	87%	90%	90%	—
Permethrin — Dragnet (est. 1978)										
0.25	CS	8	10	2	2	1	2	0.5	0.5	1
0.5††	CS	13	19	4	4	5	6	4.5	4.5	4.5
1.0††	CS	15	15	15	25	5	8	10.5	11.5	10.5
1.0††	GB	9	11	6	6	2	3	0.5	3.5	3
Control	CS	50%	50%	55%	55%	60%	60%	53%	53%	—
Control	GB	43%	43%	78%	78%	86%	86%	84%	84%	—
Permethrin — Torpedo (est. 1980. Controls same as cypermethrin)										
0.25	CS	9	9	3	7	2	2	0.5	0.5	1.5
0.5††	CS	11	13	6	9	3	5	1.5	4.5	5
1.0††	CS	19	26	25	26	3	7	6.5	7.5	7
0.5††	GB	4	4	4	4	1	1	1.5	1.5	1.5
1.0††	GB	8	9	5	5	2	2	1.5	1.5	1.5

† *EPA: years with no soil penetration through treated soil in any plot.*
FL: years with no damage worse than ASTM 9 to test blocks in 90% or more of the plots per site.
FL SE States: years with no damage worse than ASTM 9 to test blocks in 90% or more of the plots for all southeastern sites.
†† *Registered rates.*

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Table 2. Number of years that termiticides remained effective in concrete slab (CS) and ground board (GB) tests at four field sites applying the EPA guideline and Florida efficacy rule†. Fractions of years occurred when products were installed out of cycle. Control = percentage of all control plots attacked over the life of the study.

		Arizona		Florida		Mississippi		South Carolina		FL SE
% A.I.	Test	EPA	FL	EPA	FL	EPA	FL	EPA	FL	States
Imidacloprid — Premise 75 WSP (est. 1992)										
0.025	CS	14	14	14	14	1	1	3	4	2
0.05††	CS	14	14	6	12	2	2	10	10	6
0.1††	CS	14	14	14	14	2	4	5	14	8
0.15	CS	14	14	14	14	3	4	5	14	5
0.2	CS	14	14	14	14	2	5	5	5	5
0.25	CS	14	14	12	14	2	2	8	9	8
0.3	CS	14	14	14	14	5	5	5	11	14
0.4	CS	14	14	12	14	5	9	5	14	14
0.1††	GB	3	7	2	2	1	1	2	2	2
0.2	GB	8	14	2	2	2	2	2	2	2
0.3	GB	5	6	2	2	2	2	1	2	2
0.4	GB	5	7	2	3	2	2	4	5	2
Control	CS	34%	34%	77%	77%	79%	79%	38%	38%	—
Control	GB	40%	40%	96%	96%	96%	96%	71%	71%	—
Fipronil — Termidor SC (est. 1999)										
0.06††	CS	7	7	6.5	6.5	7	7	7	7	6.5+
0.125††	CS	7	7	6.5	6.5	7	7	7	7	6.5+
0.25	CS	7	7	6.5	6.5	7	7	7	7	6.5+
0.06††	GB	7	7	6.5	6.5	7	7	5	7	6.5+
0.125††	GB	7	7	6.5	6.5	7	7	7	7	6.5+
0.25	GB	0	7	2.5	6.5	2	2	7	7	6.5+
Control	CS	1%	1%	54%	54%	76%	76%	65%	65%	—
Control	GB	41%	41%	96%	96%	83%	83%	88%	88%	—
Chlorfenapyr — Phantom (est. 1996)										
0.125††	CS	10	10	1	7	1	1	6	7	1
0.25††	CS	10	10	10	10	2	5	5	10	6
0.5	CS	10	10	10	10	4	4	10	10	10
0.75	CS	10	10	1	1	5	5	10	10	10
1.0	CS	10	10	10	10	5	7	8	8	7
2.0	CS	10	10	10	10	1	9	10	10	10
0.25††	GB	9	10	0	0	2	6	5	8	6
0.5	GB	5	10	1	8	4	4	10	10	5
0.75	GB	10	10	4	7	5	10	10	10	8
1.0	GB	8	10	9	10	5	10	10	10	10
2.0	GB	6	8	10	10	10	10	8	10	10
Control	CS	22%	22%	54%	54%	89%	89%	52%	52%	—
Control	GB	43%	43%	83%	83%	98%	98%	99%	99%	—

† *EPA: years with no soil penetration through treated soil in any plot.*
FL: years with no damage worse than ASTM 9 to test blocks in 90% or more of the plots per site.
FL SE States: years with no damage worse than ASTM 9 to test blocks in 90% or more of the plots for all southeastern sites.
†† *Registered rates.*

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slabs. These methods are specified in the U.S. Environmental Protection Agency's (EPA's) Product Performance Test Guideline, OPPTS 810.3600.

The ground board test consists of a pine board centered in a 17-by-17-inch plot of exposed treated soil, replicated 10 times at each test site. The concrete slab test consists of a 17-by-17-inch plot of treated soil, covered by a 21-by-21-inch concrete slab. A covered 4-inch pipe extends through the center of the slab and contains a pine block placed on the treated soil.

Both tests apply termiticides to the soil at an equivalent pre-construction volume of 1 gallon per 10 square feet. Data is collected annually on the amount of damage to the wooden blocks and the presence of termites and mud tubes in the attacked plots.

Damage is read using the Gulfport scale: 0 = no damage, 1 = nibbles to surface etching, 2 = light damage with penetration, 3 =

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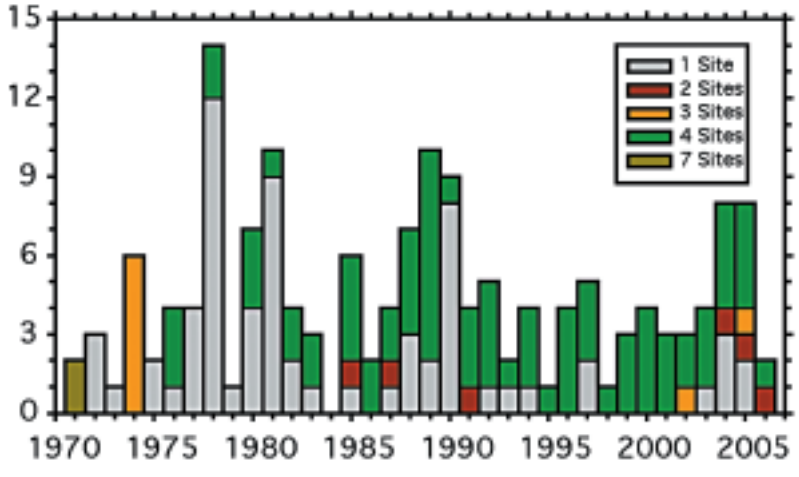
Number of candidate termiticides installed at USDA-FS test sites:



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moderate damage, 4 = heavy damage and 5 = block failure.

PERFORMANCE STANDARDS

Termiticides were evaluated using EPA's Product Performance Test Guideline (OPPTS 810.3600) and the Florida Termiticide Efficacy Rule (5E-2.0311, FAC). The OPPTS guideline is used by the EPA to determine the acceptability of both pre- and post-construction use directions for a product, while the Florida Efficacy Rule specifically applies to preventative treatments for new construction.

According to the federal guideline, termiticides remain effective during the period that they prevent termites from penetrating the treated soil in all test plots (in other words, 100-percent control). To be fully successful for registration, termiticides must satisfy this condition for at least five years at the four national test sites, using the concrete slab, ground board or stake tests. EPA places the greatest weight on the concrete slab test.

Under the Florida rule, termiticides remain effective during the period that they prevent damage worse than ASTM 9 (equivalent to Gulfport 1) to wooden test blocks in at least 90 percent of all plots. All test plots are evaluated each year, regardless of their previous attack history. To be successful, termiticides must satisfy this condition for at least five years at one or more of the Southeastern sites, containing a minimum of 10 concrete slab plots.

LATEST TEST RESULTS

Results for repellent and nonrepellent termiticides are presented in Table 1 (page 59) and Table 2 (page 60), respectively. The Florida rule applied to individual sites yielded longer product performance periods than the EPA guideline in 67 percent of the cases, and identical durations in 33 percent of the cases (excluding paired comparisons of products that never failed either standard).

Sixty-eight percent of the repellent termiticides and 66 percent of nonrepellent termiticides had longer performance periods under the Florida rule compared to the federal guideline, while 72 percent of all termiticides in concrete slabs and 60 percent of those in ground

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boards had extended performance under the Florida rule. Because ground board plots typically are attacked faster than concrete slabs (Tables 1 and 2), they failed faster under both standards – yielding a greater percentage of identical performance durations.

The state of Florida does not apply its rule on a site-by-site basis if data exists from multiple Southeastern sites; rather, it combines data from all sites. Combining the data for the three Southeastern sites (see Table 1 and Table 2), the Florida rule yielded longer performance periods than the federal guideline in 89 percent of the cases and identical durations in 11 percent of the cases.

The federal guideline is clearly more restrictive than the Florida rule in approving termiticides for registration. However, because the EPA's primary mission is to protect human health and the environment, it places more weight on toxicology and environmental data than efficacy. As a result, it sometimes registers compounds that do not strictly adhere to the guideline. Therein lies the difference between a *guideline* and a *rule*: The former may be subject to interpretation, while the latter is not.

FIPRONIL TESTING

Termidor® 80 WG has remained effective at all test sites and concentrations in concrete slabs and ground boards since its establishment in 1994. This product was installed with another fipronil formulation and two repellent termiticides in the same test area – a standard practice used for decades. Within several years, attacks at control plots virtually ceased, raising questions about the nature of the test and the appropriate experimental design used to evaluate non-repellent termiticides.

Control plots are used to evaluate the relative pressure of termites on treated plots. A lack of attack at control plots had never been observed with any Forest Service test, which was a double-edged sword:

- It was good news because the treatments caused a dramatic decline in termite activity in the test area. With 58 percent of the treated plots containing fipronil, some at very high concentrations, this compound played a significant role in the virtual elimination and subsequent suppression of termites at control plots.

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Hurricane Katrina Damaged Mississippi Plots

All of the USDA-FS test sites in the Southeast are subject to hurricanes, but those in Mississippi and Florida are most vulnerable because of their proximity to the coast. In August 2005, Hurricane Katrina pounded the Mississippi coast, and because of its great size and strength, the storm caused significant damage to forested lands well inland.

The oldest and most prominent test site in Mississippi suffered widespread and severe damage to trees, as well as some obvious damage to individual test plots. Plot losses were inventoried in May 2006. For initial reports of USDA-FS plot damage from Katrina, see page 55 of *Pest Control*'s February 2006 issue.

Katrina destroyed a small percentage of all concrete slab plots currently under study (2.9 percent) and somewhat fewer ground board plots (1.3 percent). All plots containing unregistered candidate termiticides suffered a similar small loss (2.4 percent), as did plots containing registered termiticides (2.0 percent).

From a registration standpoint, concrete slab plots

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■ However, it was bad news because the lack of attack at control plots indicated little or no pressure on treated plots, making it impossible to evaluate individual treatments.

To prevent a recurrence of this situation in field trials, the Forest Service subsequently separated non-repellent termiticides from all other compounds. For example, Termidor® SC was installed in 1999 in an expanded field design that separated test concentrations and test methods. Attacks at control plots in this test indicate adequate termite pressures on treated plots (see Table 2).

FEDERAL GUIDELINE UPDATE

In the 2005 Termiticide Report (*Pest Control,* February 2006, page 55), information was presented on a proposed revision of the federal Product Performance Test Guideline (OPPTS 810.3600). The proposal was submitted to the EPA by the Termiticide Standards Committee (TSC) of the Association of Structural Pest Control Regulatory Officials (ASPCRO).

The proposed guideline is very similar to the Florida rule, with one significant difference: Once a plot "fails" under the proposed guideline, it is considered a failure thereafter (in subsequent years). By comparison, under the Florida rule, all plots are evaluated each year regardless of their prior attack history.

The TSC expressed continued interest in the proposed revision at the ASPCRO national meeting in August 2006. At press time, action by the EPA regarding this matter was pending.

CONCLUSIONS

All registered termiticides in the United States have been evaluated by the USDA-FS. Its testing program has provided product performance data to registrants, regulators, the pest management industry and the American public for decades. Numerous candidate termiticides are presently being tested, and some will certainly be registered in the coming years.

These products will add to the choices pest management professionals (PMPs) and homeowners have, challenging them to consider their options carefully. **PC**

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Katrina Damage *from page 67*

containing candidate termiticides at concentrations targeted for registration are the most valued plots of all. Unfortunately, concentrations targeted for registration are not always known during the test, and thus, losses to these plots cannot be determined accurately. Losses of actual concrete slab plots containing candidate termiticides can be determined, however, and they were slightly higher (3.9 percent) than concrete slab plots containing registered termiticides (2.4 percent).

Although the small percentages of plots lost to the storm seem inconsequential, these values are somewhat misleading. For example, all studies containing candidate termiticides lost between one and four concrete slab plots among all concentrations, and some of these candidate termiticide test plots will contain targeted labeled rates.

Other impacts of the hurricane include damaged trees that remain in test areas, and many of these trees eventually will die and fall to the ground. As they do, additional damage to the test plots may occur.

Furthermore, there is an unprecedented amount of woody debris in test areas, and the availability of this termite habitat and food will certainly impact termite populations, and could potentially influence termite attack data at affected test plots.